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10/598,703	09/08/2006	Vasilis Ntziachristos	MGH-048AUS	9134

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EXAMINER
BAKER, DAVID S

ART UNIT	PAPER NUMBER
2884	

NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/598,703	NTZIACHRISTOS ET AL.	
	Examiner	Art Unit	
	DAVID S. BAKER	2884	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 February 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-41 and 44-49* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-41,44-49* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *08 September 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. The amendment filed 06 February 2009 has been accepted and entered.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 46 and 48 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4. The term "about" in claims 46 and 48 is a relative term which renders the claim indefinite. The term "about" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. The deletion of this indefinite term would overcome this rejection.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1-7, 9-11, 13, 19-26, 28-30, 32,38-39, and 44-49 are rejected under 35 U.S.C. 102(b) as being anticipated by Ntziachristos (WO 2002/041760 A2).

Regarding claims 1 and 21, Ntziachristos discloses a system and method for optical tomography comprising: generating an excitation light with an apparent light

source adapted to project the excitation light toward a specimen (P:3 L:11-22) having fluorescent proteins therein (P:13 L:5-18); wherein the excitation light enters the specimen becoming intrinsic light within the specimen (P:18 L:15-31); wherein the intrinsic light is adapted to excite fluorescent light from the fluorescent proteins (P:18 L:15-31), and the wherein intrinsic light and the emitted light have wavelengths in the visible wavelength region and outside the NIR region (P:18 L:15-31).

Regarding claims 2 and 22, Ntziachristos discloses that the intrinsic and fluorescent lights are diffuse (P:3 L:23 thru P:4 L:6).

Regarding claims 3 and 23, Ntziachristos discloses that the fluorescent emission light of the fluorochrome Cy 5.5 is 694nm (P:18 L:15-31).

Regarding claims 4 and 24, Ntziachristos discloses that the fluorescent emission light of the fluorochrome Cy 5.5 is 694nm (P:18 L:15-31).

Regarding claims 5 and 25, Ntziachristos discloses that the fluorescent emission light of the fluorochrome ICG is 800nm (P:18 L:15-31).

Regarding claims 6 and 26, Ntziachristos discloses a light detector receiving the intrinsic light exiting the specimen and configured for receiving the fluorescent light exiting the specimen (P:3 L:11-22); further configured for converting the received intrinsic light into first image information (P:3 L:23 thru P:4 L:6); further configured for converting the received fluorescent light into second image information (P:3 L:23 thru P:4 L:6); and an image processor coupled to the light detector and configured for generating a visible light in a diffuse medium light propagation model (P:15 L:15 thru P:16 L:25); wherein the model is configured to predict visible light propagation in a

diffuse medium; wherein the image processor further combines the first image information, the second image information, and the light propagation model (P:15 L:15 thru P:16 L:25); and further provides a tomographic image of the fluorescent proteins (P:15 L:15 thru P:16 L:25), wherein the light propagation model is configured to predict the propagation of the visible light in the visible wavelength range and outside of the NIR range (P:15 L:15 thru P:16 L:25, P:18 L:15-31).

Regarding claims 7 and 28, Ntziachristos discloses that an image processor includes a diffusion equation processor wherein a model is generated in accordance with a diffusion equation having a modified coefficient selected in accordance with the visible light propagation model and associated with the intrinsic and the fluorescent light (P:15 L:15 thru P:16 L:25).

Regarding claim 9, Ntziachristos discloses an optical scanner to provide the intrinsic light and fluorescent light to the light detector on a plurality of light paths relative to the specimen (F:2a, F:3a-3f; P:21 L:9-30).

Regarding claims 10 and 29, Ntziachristos discloses that the apparent light source is selectively moved by a light directing device to direct the excitation light on a plurality of light paths toward the specimen (P:18 L:22 thru P:19 L:19).

Regarding claims 11 and 30, Ntziachristos discloses an optical switch selectively moves the apparent light source to provide a plurality of light paths toward the specimen (P:18 L:22 thru P:19 L:19).

Regarding claims 13 and 32, Ntziachristos discloses that the apparent light source is selectively moved by a light directing device to direct the excitation light in translation along a translation axis (F:3a-3f; P:21 L:9-22).

Regarding claims 19 and 38, Ntziachristos discloses that the intrinsic light passes through the specimen as transillumination light (P:2 L:3-13, P:3 L:11-27).

Regarding claims 20 and 39, Ntziachristos discloses that the intrinsic light reflects from the specimen as reflectance light (P:21 L:9-22).

Regarding claims 44-45, Ntziachristos discloses that the intrinsic light or emitted light propagates through the specimen a distance greater than 0.5mm (P:1 L:20 thru P:2 L:13, P:3 L:11-22).

Regarding claims 46 and 48, Ntziachristos discloses that the fluorescent emission light of the fluorochrome Cy 5.5 is 694nm (P:18 L:15-31) which is larger than 400nm, thereby placing it in the claimed visible wavelength range.

Regarding claims 47 and 49, Ntziachristos discloses that the intrinsic light has a wavelength, 694nm, in the visible wavelength range and outside the NIR range (P:18 L:15-31).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

9. Claims 8, 12, 14-18, 27, 31, and 33-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ntziachristos (WO 2002/041760 A2) in view of Takada (EP 0336208 A1).

Regarding claims 8 and 27, Ntziachristos discloses the claimed invention but does not disclose expressly selectively movable detector. Ntziachristos discloses that the projection direction of the apparent light source is selectively moved by a light directing device to move the excitation light on a plurality of light paths toward the specimen (P:18 L:22 thru P:19 L:19). Takada discloses a fluorescent computed tomography system and method comprising: a selectively movable stage upon which the specimen is located and selectively moved that provides the excitation light on a plurality of light paths relative to the specimen (F:1; C:4 L:6-47). At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to provide a movable stage as taught by Takada in combination with the selectively movable apparent light source of Ntziachristos. The motivation for doing so would have been to improve the physical range over which the specimen may be examined. The movement between the light source and the specimen versus that of the detector is a matter of apparent motion in

different frames of reference. It would be a simple matter of design choice for one of ordinary skill in the art at the time the invention was made to employ a selectively movable light source, specimen, detector, or any combination thereof.

Regarding claims 12 and 31, Ntziachristos discloses the claimed invention but does not disclose expressly a selectively movable mirror. Takada discloses a fluorescent computed tomography system and method comprising: a selectively movable mirror that moves the projection direction of the apparent light source to provide a plurality of light paths toward the specimen (F:1; C:3 L50 thru C:4 L:5). At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to utilize the movable mirror of Takada as a light diverting means in the apparatus of Ntziachristos. The motivation for doing so would have been to decrease the cost of the light diversion set up since by using a simple mirror rather than an optical switch with several optical fibers.

Regarding claims 14 and 33, Ntziachristos discloses the claimed invention but does not disclose expressly that the specimen is selectively movable to provide the excitation light on a plurality of light paths relative to the specimen. Takada discloses a fluorescent computed tomography system and method comprising: a selectively movable stage upon which the specimen is located and selectively moved that provides the excitation light on a plurality of light paths relative to the specimen (F:1; C:4 L:6-47). At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to provide a movable stage as taught by Takada as the specimen holder of

Ntziachristos. The motivation for doing so would have been to improve the physical range over which the specimen may be examined.

Regarding claims 15 and 34, Ntziachristos and Takada disclose the claimed invention but do not disclose expressly that the specimen is selectively movable in a rotation about a specimen rotation axis. However, at the time the invention was made, it would have been obvious to a person of ordinary skill in the art to alter the specimen stage of Ntziachristos and Takada to allow for rotation. The motivation for doing so would have been to improve the physical range over which the specimen may be examined.

Regarding claims 16 and 35, Takada disclose that the specimen is selectively movable in translation along at least one specimen translation axis (F:1; C:4 L:6-47).

Regarding claims 17 and 36, Takada disclose that the specimen is selectively movable in translation along at least one specimen translation axis (F:1; C:4 L:6-47), but Ntziachristos and Takada do not disclose expressly that the specimen is selectively movable in a rotation about a specimen rotation axis. However, at the time the invention was made, it would have been obvious to a person of ordinary skill in the art to alter the specimen stage of Ntziachristos and Takada to allow for rotation. The motivation for doing so would have been to improve the physical range over which the specimen may be examined.

Regarding claims 18 and 37, Ntziachristos discloses that the projection direction of the apparent light source is selectively moved by a light directing device to move the excitation light on a plurality of light paths toward the specimen (P:18 L:22 thru P:19

L:19). Ntziachristos does not disclose expressly that the specimen is selectively movable to provide the excitation light on a plurality of light paths relative to the specimen. Takada discloses a fluorescent computed tomography system and method comprising: a selectively movable stage upon which the specimen is located and selectively moved that provides the excitation light on a plurality of light paths relative to the specimen (F:1; C:4 L:6-47). At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to provide a movable stage as taught by Takada as the specimen holder of Ntziachristos. The motivation for doing so would have been to improve the physical range over which the specimen may be examined.

10. Claims 40-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takada (EP 0336208 A1) in view of Ntziachristos (WO 2002/041760 A2).

Regarding claim 40, Takada discloses a fluorescent computed tomography system and method comprising: a selectively movable mirror that moves a projection direction apparent light source to provide a plurality of light paths toward the specimen (F:1; C:3 L50 thru C:4 L:5) a selectively movable stage upon which the specimen is located and selectively moved that provides the excitation light on a plurality of light paths relative to the specimen (F:1; C:4 L:6-47). Takada does not disclose expressly an optical fiber coupled to the selectively movable component. Ntziachristos discloses a system and method for optical tomography comprising: optical fibers coupled to the specimen stage for receiving emitted light (F:2a, F:3a-3f; P:21 L:23-30). At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to employ the

optical fibers of Ntziachristos to couple the specimen platform to the detector of Takada. The motivation for doing so would have been to improve the light collection efficiency.

Regarding claim 41, Takada discloses a selectively movable mirror that moves the apparent light source to provide a plurality of light paths toward the specimen (F:1; C:3 L50 thru C:4 L:5).

Response to Arguments

11. Applicant's arguments filed 04 January 2009 have been fully considered but they are not persuasive.

The applicant alleges that Ntziachristos fails to disclose fluorescent light inside the visible wavelength range and outside the NIR range. The examiner respectfully disagrees. The applicant clearly defines, on page 8 of the instant specification, a "visible wavelength range of about 400nm to 700nm" and an "NIR range of 700nm to 1000nm". Ntziachristos discloses fluorescent light at 694nm (P:18 L:15-31). By the applicant's own definition, the prior art reads on the instant claims.

The applicant alleges that Ntziachristos fails to disclose fluorescent light having a wavelength in the red portion of the visible spectrum. The examiner respectfully disagrees. The applicant clearly defines, on page 8 of the instant specification, a "visible wavelength range of about 400nm to 700nm" and an "NIR range of 700nm to 1000nm". Ntziachristos discloses fluorescent light at 694nm (P:18 L:15-31) which falls in the red region of the visible spectrum.

The applicant alleges that Ntziachristos fails to disclose wherein the light propagation model is configured to predict the propagation of the visible light in the

visible wavelength range and outside of the NIR range. The examiner respectfully disagrees. Ntziachristos discloses fluorescent light at 694nm (P:18 L:15-31); the light propagation model of a diffuse medium is directed toward the fluoresced light (P:15 L:15 thru P:16 L:25), which is light at 694nm.

The applicant alleges that the combination of Ntziachristos and Takada is improper. The examiner respectfully disagrees. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

The examiner has provided the scope of the prior art with referenced passages. The limitation lacking in each prior art reference are outlined clearly in the claimed language. The ordinary skill is resolved; the examiner suggests that since both references are directed toward biological specimen imaging, they are in a related art and would not be outside the realm of one of ordinary skill in the art's awareness. Lastly, the examiner has analyzed the application and determined that the known modification of the sample stage in order to improve the scanning range of the system would be arrived at by one of ordinary skill in the art based on the motivation provided. Specifically, the examiner

states that the motivation for combining would have been to improve the physical range over which the specimen may be examined.

Conclusion

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DAVID S. BAKER whose telephone number is (571)272-6003. The examiner can normally be reached on MTWRF 10:30am-7:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David P. Porta can be reached on (571) 272-2444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/David P. Porta/
Supervisory Patent Examiner, Art Unit 2884

/David S Baker/
Examiner, Art Unit 2884